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In this issue...

- In Memoriam
- Focusing on Young People
- NSERC's 20th Anniversary Coming Up
- Making a Future in Industry: National Workshop Ends on an Upbeat Note
- Profiles
- Results of the 1997 Strategic Project Grants Competition
- Moratorium Placed on New Faculty Support Grants
- Symposium Highlights Success Stories, Sets Action Agenda
- Seven NCEs to Share $94.3 Million
- Research Update
- NSERC Improves Annual Reporting to Parliament

In Memoriam

It is with deep regret that we announce the passing of Dr. Keith Brimacombe, the President and Chief Executive Officer of the Canada Foundation for Innovation. He died in Vancouver on December 16.

Dr. Brimacombe leaves an exceptional legacy to Canada and the research community. He was one of the innovative giants of 20th century metallurgical process engineering and a role model for young Canadian scientists and engineers. The 1997 recipient of the Canada Gold Medal for Science and Engineering will be remembered particularly for his major contributions to the economic competitiveness of the Canadian steel industry and to the nationwide effort to build productive research links between industry and universities.

Focusing on Young People

Editorial by Tom Brzustowski

What follows is the brief text I presented to the House of Commons

Standing Committee on Finance on October 28. The presentation was the response to a question posed by the Committee: "What is the best way that government can help to ensure that there is a wide range of job opportunities in the new economy for all Canadians?" My answer was, "Give our young people the opportunity to obtain the best skills and knowledge, and the incentives to put them to productive use in Canada." I then elaborated that answer with reference to the elements of NSERC's programs that help the young people who are developing their capabilities for world-class scientific and engineering work.

In my oral presentation I pointed out that the $160 million per year referred to in the final paragraph is only part of the financial need of the researchers supported by NSERC. The total needs will be much clearer in a few months when the GSC's have produced their estimate of the shortfall in their budget, and when the submissions for the Reallocations process have been received.

When I spoke to the GSC's last February, I had expected that new investments would be considered for the February 1999 budget. It now seems that the fiscal situation is improving more quickly than had been expected, and that new investments might be considered one year earlier. Therefore, an invitation to address the Finance Committee when the 1998-99 budget was being prepared was an opportunity not to be missed. Because of the emphasis on young people in the government's current agenda, it seemed both appropriate and timely to sort through the needs identified in two ***Contact*** editorials (see Spring and Summer 1997 issues), identify the ones that deal with young people, set realistic targets for improvement, and estimate their cost. That process produced the estimate of $160 million.

I think this presentation to the Finance Committee addresses a real need, and I hope that those who prepare the next budget will be persuaded to take it into account.

This presentation focuses on young people. It's about providing all young Canadians with the opportunities to develop their talents and skills for S&T to the highest level. It's about opportunities for Canada to use these talents and skills to contribute to the prosperity and well being of all Canadians.

NSERC supports university research in the natural sciences and engineering, and the advanced training of young people through research. Its programs are the most important source of technology-based innovation in Canada. The advanced training that the programs support is essential for those who would become researchers, but it is also extremely valuable for preparing the most creative innovators and problem solvers, who will be active in all areas of our economy.

> ***The key to Canada's success in the knowledge-based economy is to prepare our young people to match the best in the world in all the important areas of human endeavour. They are the source of Canada's capacity for innovation.***

This work must start early.

NSERC's Undergraduate Student Research Awards (USRA) program supports some of the best under-graduates by providing them with their first experience in research, either in a university lab or in industry. This experience gives them a head start on advanced training and a career in research. This is currently a small program, supporting only a few hundred students each year, and it is restricted to Canada's smaller universities. The USRA program must be extended to many more students, in **all** of Canada's universities.

> ***We want to quadruple the number of undergraduate student research awards in industrial and university laboratories across Canada.***

NSERC supports about 1/3 of Canada's graduate students in science and engineering, through postgraduate scholarships to individuals, as well as through research assistantships paid by professors out of their NSERC grants.

At one time postgraduate scholarships were worth a substantial proportion of the average starting salaries of those with bachelor's degrees, they were untaxed, and tuition was low. As a result, students with the qualifications for postgraduate study could pursue their education without any great economic penalty. But those scholarships, whose value is $15,700 per year for those in master's programs and $17,400 per year for those in doctoral study, have not changed significantly for five years. Today they represent an income level below the poverty line, they are taxable, and tuition fees are high and rising fast.

Moreover, many young Canadians with the interest and ability to pursue postgraduate studies in science and engineering complete their bachelor's degrees already many thousands of dollars in debt. For people in such circumstances, the earnings foregone, and the possibility of accumulating additional debt, during the additional years of postgraduate study represent an insurmountable obstacle. As a result they forego developing to their full potential, or they may go on to postgraduate study abroad, for example in the United States, where excellent students receive much higher levels of support. In either case, Canada stands to lose their capabilities.

> ***The number of graduate students supported by NSERC has to increase. Our goal is to up the numbers by 25 percent.***
>
> ***The value of postgraduate scholarships must be increased by at least a quarter.***

Postgraduate scholarships account for about half the graduate students supported by NSERC. The other half are paid out of NSERC grants to university faculty members. The maximum stipend that may be paid to a graduate student from an NSERC grant is $15,000 per

year. Thus the situation of such students is much the same as that of

those holding postgraduate scholarships, except that some of them are paid at a rate much lower than the maximum permissible stipend.

The value of the maximum stipend for graduate students should also be increased by 25 percent, and the best way of doing this would be to add funds to research grants.

Postdoctoral fellows (PDFs) are very important members of research teams. These are people who have completed their doctorate, but wish to broaden their knowledge of their subject, or acquire new techniques and skills, before embarking on a career in industry or a university. PDFs are mobile: most change universities to accept their position, and many travel abroad, or come to Canada from other countries. In this way they help spread new knowledge.

As with graduate students, NSERC supports PDFs both through fellowships to individuals (awarded competitively) and through stipends paid out of research grants. The current value of an NSERC Postdoctoral Fellowship is $30,000 per year less than the average science or engineering bachelor's graduate starting his or her first job gets. This level is also much lower than that of fellowships offered by agencies abroad. As a result, Canadian PDFs are inclined to take their skills and knowledge to research labs in other countries. Also, Canadian researchers are less able to attract excellent PDFs from abroad.

The value of NSERC Postdoctoral Fellowships should be increased. The initial goal is 25 percent.

To support a PDF from a research grant requires that the grant be sufficient to pay a stipend. However, many Canadian researchers whose work could attract and benefit from a PDF are unable to take one on because their research grant is too small. This means that important research is not done, or is done more slowly than it should be, losing ground to better-funded competitors. NSERC's Grant Selection Committees, who make recommendations on the size of grants, are well placed to judge the merits of a request for PDF funding in a grant application. These committees should have the ability to make grants large enough to allow for the support of more PDFs.

We should increase the number of PDFs supported by payments from grants by 10 percent overall, and maximum stipends for PDFs by 25 percent.

A significant percentage of Canada's highly trained young people go abroad, either for additional study or to find rewarding employment. If such people do not return to Canada, Canada loses. We need new mechanisms to attract such people into research careers in Canada.

NSERC's Industrial Research Fellowships (IRF) program is one such: it provides support for those entering R&D careers in industry. Demand on this very successful program is very high, and its contribution to Canada's economy is significant.

Some opportunities also exist to attract people home to careers in Canada's universities, which are currently experiencing a wave of retirements. Many of these vacancies are unfilled, or filled with temporary lecturers (thus covering the teaching aspects but neglecting the research), since many universities are experiencing financial stresses which make hiring new permanent staff problematic. A program which supported "bridging" this difficult period, assisting universities to hire new permanent faculty now when they are needed, and drawing highly talented Canadians to come home to university careers, would be very useful.

The number of Industrial Research Fellowships available must be increased by a quarter.

A "bridging" program for new faculty should be introduced that would add 50 new members annually to Canadian university science and engineering faculties.

In addition to preparing more of our young people for careers in science and engineering, and convincing those who have gone abroad to come home, Canada must increase its funding for research in general. Without excellent research Canada's capacity for innovation will quickly deteriorate. The research funded by NSERC represents a balance between basic research supported by grants and project research supported through university-industry partnerships.

Excellent basic research makes everything else possible. It provides the basis for innovation, and it enables Canadian researchers to act as a conduit for the 97 percent of world research that is **not** done in Canada.

Project research deals with more immediate problems in industry, connecting the researchers who generate new knowledge with those who use new knowledge productively in Canada's economy.

Young researchers enter the research system continuously, and require support to establish their careers and their links to other sectors. All young researchers who choose careers in Canadian universities represent an investment opportunity for Canada. Research grants enable them to launch significant work in important areas of basic research. Access to the full spectrum of university-industry project research support helps them to build connections with industry.

The resources available to both research grants and project research programs should be increased in order to raise the average funding rate for first-time applications from junior faculty by 25 percent.

The Canada Foundation for Innovation will provide important help with the installation of new research infrastructure, and consequently will make important contributions to the careers of new researchers. However, the research done with this new infrastructure will be paid for out of research grants. The potential demand for research grant

funding arising from the existence of new infrastructure supported by the CFI will be substantial.

> ***The funding for research grants should be increased by a quarter to allow Canada's researchers to take full advantage of new CFI-supported infrastructure.***

The most important result of NSERC's work is people highly qualified people, innovators. We estimate that the increases I've been talking about will require an investment of **$160 million**. We believe that this represents an essential and timely investment in the capability of our young people, and our researchers, to provide Canadians with a better future.

NSERC's 20th Anniversary Coming Up

> *On May 1, 1998, NSERC will be twenty years old! Over the past two decades the Council has been investing in world-class research in Canadian universities and in the advanced training of many of Canada's best young scientists and engineers. The returns on these investments are discoveries and innovations, and highly qualified young people who can put them to use in the economy and throughout society.*

To mark our anniversary year, we are organizing a series of special activities that will underscore the contributions made by university-based researchers to Canada's economy and to the quality of life of its citizens. These activities will include:

- Presentation of the 1998 Canada Gold Medal for Science and Engineering by the Governor General of Canada at a special event at Rideau Hall in Ottawa;
- A "Report to the Nation" by NSERC President Tom Brzustowski, which will include a retrospective on NSERC-supported research accomplishments and a look at the future;
- An event recognizing the service of past NSERC presidents, Council members and staff;
- An awareness campaign to show Canadians how they and Canada's economy have benefited from the Council's investments in research. It will focus on the discoveries and innovations that have had and are having a direct impact on Canadians' everyday lives and that have helped to broaden the horizons for a new generation of highly qualified Canadians who will lead us into the next millenium.

Details on these activities and others will be published on our Web site and in future issues of ***Contact***.

Making a Future in Industry:

National Workshop Ends on an Upbeat Note

Over three dozen people including holders of NSERC industrial scholarships, and representatives of student associations, universities, companies and Council gathered in Ottawa the weekend of October 31 to November 2 to take part in the second national workshop on the needs of the next generation of Canadian researchers.

The theme this year was "Making a Future in Industry," and the workshop was aimed at identifying issues of concern to the next generation of Canadian researchers making a career in industry, developing ideas as to how these needs can be addressed, and identifying ways in which NSERC could adjust its programs and activities in response.

Participants were assigned to one of three discussion groups to identify issues and concerns as well as potential ideas for change. Each group identified many elements requiring change, including the need to add "human" skills (such as project management, communication and leadership skills as well as the ability to work in teams) to the training of researchers; and the need to address the culture discrepancy that exists between academia and the private sector, and what is perceived as the increasingly obsolete discipline-based specialization in universities.

During the closing plenary session on Sunday morning, participants were asked to reach a consensus on priorities for change and to make a series of recommendations to NSERC. Some of the recommendations they came up with were quite novel. They suggested, for instance, that NSERC use its Web site to publicize career opportunities for Industrial Research Fellowship holders; create a "virtual space," where innovative linkages between university and industry could be nurtured in parallel with traditional mechanisms for collaboration; establish task forces on co-op graduate education and the mobilization of Canada's intellectual resources; and establish "team scholarships" for students working on collaborative research. The proposals will be forwarded to Council for review and a full report will be available at a later date.

Profiles

Taarna Studios Inc.: The face of excellence in 3-D

The University of Montreal/Taarna partnership is one of six winners of the 1997 NSERC/Conference Board of Canada R&D Partnerships Awards

Montreal cinematographer Pierre Lachapelle captured the attention of the film industry with the release of his first animated short in 1985. Today, Taarna Studios Inc., where Dr. Lachapelle is president and director of research, is gaining recognition as one of the world's top innovators in computer-based three-dimensional graphic animation. A partnership between Taarna and the University of Montreal's département d'informatique et de recherche opérationnelle, now in its third year, has been a contributing factor in the studio's worldwide reputation for excellence.

Dr. Lachapelle, a UofM alumnus, had been collaborating with his alma mater since 1981. In 1994, Taarna and the university reinforced that relationship by signing a long-term research partnership that would see the studio make an initial investment of $250,000. These funds would be used to help the university's computer graphics laboratory acquire state-of-the-art equipment and to compensate UofM graduate students for their work on behalf of Taarna.

As part of the agreement Taarna agreed to provide the students with hands-on research opportunities directly related to the animated film industry. Four master's degree students have been working under the supervision of Dr. Lachapelle and NSERC grantee Pierre Poulin, director of the university's computer graphics research laboratory. The students have ready access to Taarna's expertise, research equipment and studios. In return, Taarna has been on the receiving end of some groundbreaking advances in animation.

One of those advancements came last January when UofM master's student Cyriaque Ngoran Kouadio presented Taarna with the results of a research project related to his thesis. Mr. Kouadio developed an algorithm to reconstruct, in real-time, 3-D animation of an actor's facial expression as seen through the eyes of a digital motion-capture system. Mr. Kouadio's algorithm proved reliable, the software's user-interface was friendly, and the product succeeded in animating faces with an outstanding degree of realism.

Mr. Kouadio's thesis was accepted by the university last April. Meanwhile, his innovative research has had a profound impact on LIFEsource system, a commercially marketed computer program that captures real-life movements and transforms them into character animation. The software is marketed by Digits'n Arts Software Inc., a subsidiary of Taarna Studios Inc. When Mr. Kouadio joined Taarna's staff earlier this year, the studio reaped another of the benefits it had hoped to achieve by signing the partnership agreement with the university.

"We're always searching for highly qualified people to come to work with us," says Taarna product manager Lucie Marchand. "One of our first objectives in entering the agreement with the university was to help develop an expert research team, with the goal of attracting members of that team to join us in the studio."

The next phase of the research partnership focuses on developing better ways to produce 3-D images of hair, eyes and skin. A three-year Strategic project award from NSERC is supporting the

underlying scientific work. Also in the works is a half-hour television special that will give a behind-the-scenes look at how the company's character animation is achieved, as well as the dynamic relationship between Taarna and the University of Montreal that made it all possible.

Lilian Thompson: Flaxseed a cancer-fighter?

Canadian agriculture may be getting the blues brilliant blue fields of flax, that is. This could be the outcome of promising research on the cancer-fighting abilities of flaxseed compounds being conducted at the University of Toronto.

Nutritional sciences professor Lilian Thompson has found that lignan, a component of flaxseed, can reduce the occurrence and growth rate of breast cancers in animals by more than 50 percent. The compound also shows promise at inhibiting the development of colon cancer. Human clinical trials have just begun.

Lignan occurs naturally in many grains, fruits and vegetables but Dr. Thompson found flaxseed to be the richest source, with about 100 times the concentration of lignan found in most other plant foods. When plant lignan is ingested it is converted to mammalian lignan, a compound that is chemically similar to estrogen. It is this link to estrogen that explains the apparent cancer fighting ability of lignan.

Dr. Thompson's work on lignan came about as an offshoot of her research on human nutrition. She was investigating dietary compounds that can reduce the availability of nutrients to the body (anti-nutrients). "This work led me to realize that not all anti-nutrients were detrimental," says Dr. Thompson. "I became particularly interested in the estrogen-like chemical structure of lignan. With its chemical similarity to estrogen, I realized that lignan may have potential for reducing hormone-related diseases like breast cancer."

Canada is a major exporter of flaxseed to the world market. Although the acreage planted to flax has been decreasing over the past few decades, the crop does well throughout the agricultural regions of the country. If flaxseed proves to have anti-cancer properties in humans, Canada stands to be a major beneficiary of an increased demand for flaxseed.

The amount of flaxseed being used in current studies on human breast cancer is 25 grams per day, baked into one flaxseed muffin. Word is getting around about Dr. Thompson's research. Already many bakeries are incorporating flaxseed in some of their products, and some cereal companies are also showing interest. Don't be surprised to see blue fields of flax become a bigger part of the rural summer landscape.

Results of the 1997 Strategic Project

Grants Competition

Following its recent Strategic Project Grants competition, NSERC awarded 76 grants totalling $7.6 million in 1997-98. Strategic project grants support high-quality university research that is expected to result in a specific economic, social, industial or environmental benefit to Canada.

The projects fall within the natural sciences and engineering in general as well as within six areas the Council targeted for acceleration through Strategic Projects. Although fewer applications were received this year than last, the overall success and funding rates increased. Table 1 summarizes the results of the competition, by area.

Table 1. Competition Summary

Area	No. of Appl.	Success Awards	Success Rate %	Total Request. (M of $)	Funding Award.	Funding Rate %
General Areas	28	5	18	2.9	0.5	16
Targeted Areas						
Biotechnology	66	24	36	6.9	2.2	32
Energy Efficiency Technologies	17	4	24	1.7	0.4	21
Environmental Technologies	70	17	24	7.5	1.9	26
Information Technologies	35	8	23	4.0	0.8	21
Manufacturing and Processing Technologies	13	4	31	1.6	0.4	27
Materials Technologies	51	14	29	5.1	1.4	27
TOTAL	**280**	**76**	**27**	**29.7**	**7.6**	**26**

Partnerships and Interactions

Active participation by non-university partners is a requirement for all strategic research projects; this year, however, the selection panels evaluating the applications observed a noticeable increase in both the quality of the partnerships and the involvement of the partners.

A total of 266 partners are involved in the successful proposals: 170 from industry; 54 from government; and 42 other non-university. The majority of the industrial partners are almost equally split between small and large-sized companies. The participation of medium-sized companies has decreased this year and represents only 14% of the industrial partners.

Although industrial partners are not required to make cash or in-kind contributions, panels consider such contributions to be an indication of active participation in the project. Panels assess the level of commitment in relation to the type of partner organization, its ability to contribute, the relevance of the research to the interests of the partner organization and the complexity and risk of the proposed research.

This year's awards are notable for the level of the non-university partners' cash contributions (in millions of dollars) over the lifetime of the projects:

NSERC investment	$23.9
Industrial investment	2.1
Government investment	1.6
Other non-university investment	0.3
In-kind contributions	14.6
Overall leverage from partners	78.1%

In comparison with last year, there has been a marked increase in the level of the collaborating partners' in-kind contribution. Based on the calculated investment for the life of the projects funded from this competition, every dollar invested by NSERC will leverage approximately $0.61 of in-kind support from the collaborating partners, compared with only $0.39 last year. The majority of the in-kind support (67%) is being provided by the industrial partners.

Competition Highlights

These projects have been selected as examples of the highly rated proposals funded in the Strategic Project Grants competition.

Title of project: **Development of all-female halibut stocks for aquaculture**
Grantee: **Dr. Tillmann J. Benfey, Dept. of Biology, University of New Brunswick**

Award: **$214,434 over 3 years**

Over the past twenty years Canada has become a world leader in cold-water aquaculture, producing more than 25,000 metric tonnes of salmon annually. This rate of production and the increased wild harvest of salmon from the north Pacific have combined to reduce the profit margin within this industry. As a result, there is currently much interest in the development of "new" species for aquaculture. Halibut is one fish identified as being particularly well suited for development.

Over the next three years, Dr. Benfey proposes to develop an all-female stock of halibut for aquaculture. Because females grow faster and larger than males, they offer tremendous economic advantages. Genetic and hormonal manipulations have already been used successfully to produce all-female stocks of salmon and trout for aquaculture and similar methods will be tested for halibut. The results of this research will provide a better understanding of the basic mechanisms of sex determination in flatfish, and provide the aquaculture industry with effective methods for increasing productivity by rearing only female stocks.

This project will be conducted in collaboration with the Department of Fisheries and Oceans, the NRC Institute of Marine Biosciences and three industry partners: Maritime Mariculture Inc., R&R Finfish Developments Ltd. and Stolt Sea Farm Inc. The partners are providing in-kind contributions such as staff time, fish and tank space, treated water and feedstuffs to hold and grow experimental animals.

Title of project: **Gas-fired infrared processing of pulses**
Grantee: **Dr. Susan Arntfield, Dept. of Food Science, Univesity of Manitoba**
Award: **$407,500 over 4 years**

The typical North American lifestyle has resulted in an increasing demand for quick cooking products. Pulse crops like lentils, field peas, beans and others, while representing a high fibre, low fat and natural protein source, have traditionally been underutilized. Current methods for preparing pulse crops for consumption are typically time consuming, often involving a soaking step followed by prolonged cooking (up to several hours). While this can be circumvented by the use of canned products, these products have limited applications and are not appropriate for export markets. Prices can also be quite high since the cost of packaging in cans represents approximately 40 percent of the cost of the finished product.

The potential for using natural gas-fired infrared heat processing (micronization) to produce pulse crops with reduced cooking time offers advantages in terms of optimized energy utilization and increased value for agricultural resources. The research team led by Dr. Susan Arntfield will attempt to establish the micronization process as a viable technology for adding value to a wide variety of pulse crops so that they become more marketable. Possibilities for further processing of micronized legumes for snack foods by extrusion or flaking will also be investigated.

The project will be conducted in collaboration with Gas Technology Canada and InfraReady Food Products Ltd. from Saskatchewan, who together will contribute $134,000 in-kind over 4 years to the project. The Manitoba Pulse Growers Association Inc. will be providing consultative support.

Moratorium Placed on New Faculty Support Grants

Due to the high demand on the fiscal resources of the Research Partnerships Program, Council recently approved a moratorium on the New Faculty Support Grants initiative.

New Faculty Support Grants are designed to help universities, jointly with industry, fill junior faculty positions in research areas of interest to industry, by providing an amount equal to a cash contribution from industry to the salary of incumbents. The initiative remains a priority for Council, but fiscal circumstances dictate placing existing funding allocations in areas of more pressing need and perceived higher priority.

Applications received at NSERC by December 1, 1997, will be processed, but no new applications will be entertained until further notice.

Symposium Highlights Success Stories, Sets Action Agenda

> *More than 150 of Canada's top researchers, industry representatives, university decision-makers and government officials took part in a recent symposium aimed at fostering closer ties between Canadian university researchers and industry.*

Six university-industry research partnerships representing seven Canadian universities and 13 companies were recognized for outstanding achievements in innovation and wealth creation at the talks, held on October 23 and 24 in Richmond, B.C.

The University-Industry Synergy Symposium and R&D Partnerships Awards program, now in their third year, are sponsored by NSERC and The Conference Board of Canada. The symposium and awards presentation coincided with National Science and Technology Week, October 17 to 26.

Speaking on behalf of the federal government, Secretary of State (Science, Research and Development) Ron Duhamel lauded NSERC and the Conference Board for sponsoring the talks and said Canadians need to make significant investments in science, innovation and technology.

"The success stories identified by NSERC and The Conference Board of Canada are clear examples of successful partnerships and the power of collaboration," he said. "What we have here are people working together to find solutions to real-life problems. We must talk about these initiatives, praise them, highlight them, showcase them, so we can awaken young people's minds to the future."

The University-Industry R&D Partnerships Awards recognize excellence in university research, superior management, innovation, creativity and entrepreneurship. The winning partnerships demonstrated an effective use of university and industry resources, commercial benefits to industry and tangible rewards to the university. Each award included a $10,000 NSERC research grant for the university partners.

Receiving the awards were:

- Tristar Industries and the University of British Columbia
- Taarna Studios Inc. and the University of Montreal
- The Westaim Corporation and the University of Alberta
- Timminco Ltd. and McGill University
- GIRO, AD OPT, École des Hautes Études Commerciales and École Polytechnique, and
- The Canadian Strategic Software Consortium, involving the University of Waterloo and seven Canadian software companies Fulcrum Technologies Inc., Systems Graftnetix Inc., InContext Corporation, Megalith Technologies Inc., Open Text Corporation, PSSoftware Solutions Ltd., and SoftQuad Inc.

The winning partnerships were selected from more than 60 university-industry partners from across Canada that competed in this year's awards program.

In his keynote address to the conference, Dr. Paul Romer, professor of economics at Stanford University and Royal Bank Fellow with the Canadian Institute for Advanced Research, said the so-called linear model of innovation and wealth creation is a myth. That model sees university basic research as the first step in a process that leads to applied research and eventual commercialization by the private sector. According to Dr. Romer, however, it's not that simple. "The correlation between economic success and prominence in basic research is much weaker than many people think."

Dr. Romer's model suggesting that knowledge and technology play a key role in generating and sustaining economic development has spawned a new generation of economic research. Citing historical evidence from the United States, Dr. Romer argued that university programs aimed at training people to solve problems in the private sector played a major role in that country's spectacular economic growth rates throughout much of this century. "Business doesn't make charitable donations to universities. Self-interest is what drives the economy and leads to economic growth," said Dr. Romer.

In another keynote presentation, Julia Levy, president and CEO of QLT PhotoTherapeutics Inc., discussed the research partnership that led to the development of her firm. QLT is a spin-off company

that grew out of a research initiative undertaken by Dr. Levy, researcher David Dolphin and others at the University of British Columbia in 1981. The company and the university were winners of an R&D Partnerships Award in 1996.

QLT specializes in light-activated drugs used in cancer therapy. Dr. Levy said that a key event in the growth of the company was a 1982 strategic grant from NSERC that focused on the core science of the company.

"We also realized we had to get more businesslike in our approach to our science," she said. "Investors don't reward you for being a brilliant scientist. They want you to focus and say when you're going to have a return on their investment."

Also speaking at the conference was Keith Brimacombe, newly appointed president and CEO of the Canada Foundation for Innovation. Dr. Brimacombe congratulated the federal government for making a link between Canada's socio-economic development and the development of Canadian science and technology and for creating a climate that fosters partnerships in that development. "I think it is a masterstroke to invest in our people," he said.

"The foundation is not about the simple acquisition of hardware," said Dr. Brimacombe. "It's about providing Canadian researchers with the wherewithal to exercise creativity and innovation to their fullest. It's about providing bright young minds with the tools they need to grow and develop and make their own contributions to our country and to our world."

The symposium included workshops on intellectual property rights, university-based industrial research centres, venture capital, and university and industry infrastructures. Recommendations coming out of the workshops included a call for NSERC and the Conference Board to develop a primer for university-industry partners, further study into the barriers to increased collaboration and initiatives aimed at informing industry decision-makers of the benefits of research collaboration.

"Our ability to create wealth will be determined by our success in bringing together those who create knowledge with those who know how to put knowledge to productive use," said NSERC president Tom Brzustowski. "This series of conferences provides an opportunity to learn, to define issues, to move forward with better knowledge of what's involved in university-industry partnerships."

NSERC and the Conference Board plan to continue with the awards program and a fourth symposium for 1998.

A booklet describing the 1997 winning partnerships is available upon request from the Conference Board. Meanwhile, proceedings of the 1997 symposium will be available from NSERC early in the new year.

Seven NCEs to Share $94.3 Million

After a tough competition the first since the Networks of Centres of Excellence (NCE) program was made permanent in the 1997 Budget , seven NCEs will divide up $94.3 million over the next four years.

This was a competition for additional funding among the ten networks that had already succeeded in two earlier competitions and received funding for the past eight years. The quality of all the applicants in this competition was extremely high. All have logged major accomplishments and all have been a huge stimulus to their respective sectors.

The 10 competing networks requested a total of $44 million in year one, an amount substantially higher than the $25 million per annum available.

These ten networks will already have received $301.8 million by the end of the current fiscal year. Four other networks, launched in 1994-95, were not part of this competition, but will undergo a mid-term review next year. For the period 1995-1999, the federal government will have invested $42.1 million in those four networks. Also, under the permanent NCE program, competitions are held every three to four years with 25% of the competition budget available to fund new networks. The first of these competitions is presently under way; 74 letters of intent to form new NCEs were received by the November 1, 1997, deadline.

In Winnipeg on October 3, 1997, Dr. Tom Brzustowski, President of NSERC and Chair of the NCE Steering Committee, announced the results of the competition and congratulated the seven networks on their achievements and their strategic plans for maintaining their momentum. He recalled that one goal of the NCE funding was to develop sustainable partnerships between the researchers and those who might put their results to use. He also underlined the fact that NCE researchers continued to be supported by the granting councils, and would continue to be eligible for council support when their NCE funding expired.

"The funding for research and training in Canadian universities through the Councils' peer-reviewed research programs is the foundation upon which the NCE program is built," said Dr. Brzustowski.

Details of the awards are given in the following table.

The 14 Networks of Centres of Excellence, after the Renewal Competition

	Total Awards (millions of $)		
	1989-1998	**1995-1999**	**1998-2002**

Health and Biotechnology

Canadian Bacterial Diseases Network	1989-2005*	33.5	15.2
Canadian Genetic Diseases Network	1989-2005*	31.8	18.0
Inspiraplex Respiratory Health NCE	1989-1998	22.4	
NeuroScience Network	1989-1998	46.4	
Protein Engineering Network of Centres of Excellence	1989-2005*	36.8	18.7
HEALNet Health Evidence Application and Linkage Network	1995-2002*		8.4

Information Technology

Canadian Institute for Telecommunications Research (CITR)	1989-2002	27.4	7.7
Institute for Robotics and Intelligent Systems (IRIS)	1989-2005*	44.3	17.5
Micronet Micro-electronic Devices, Circuits and Systems	1989-2005*	20.1	9.2

Natural Resources

Mechanical Wood-Pulps Network	1989-2002	27.2	8.0
Sustainable Forest Management (SFM) Network	1995-2002*		10.6

Infrastructure

Concrete Canada	1989-1998	11.9	
Intelligent Sensing for Innovative Structures (ISIS)	1995-2002*	9.3	

Technology-Based Learning

TeleLearning-NCE	1995-2002*		12.8

TOTAL (1998-2002 award) 94.3

*** NCE funding contingent on a positive mid-term progress review.**

A Very Successful Program

The success of this innovative program that provides funds to accelerate the transfer of research results was highlighted in an independent 1997 study that showed that the program was achieving all four of its primary objectives. Researchers are world leaders in their field with a history of support by the granting councils. The Networks provide high quality cross-disciplinary training to students. They promote expanded knowledge exchange among researchers, as well as between researchers and their private and public sector partners. NCE industry partners access university expertise to help them develop innovative products and make better decisions, staying competitive and saving tax dollars.

A Rigorous, but Fair Peer Review and Selection Process

Proposals submitted by the ten networks on May 1, 1997, for renewal of their grant contained progress reports on the past four years and strategic plans for the next funding cycle. Part of the requirement was for the networks to describe a strategy to become independent of NCE funding over the next seven years.

The NCE Selection Committee, composed of international experts with broad experience from the academic, research, industrial and finance sectors, reviewed the applications from all of the competing networks, together with the reports of the ten expert panels (one for each network) that had been constituted. The members of the Selection Committee recognized the importance of each of the research areas, the excellence of many of the researchers involved in each NCE, and the high quality of much of the research proposed in each application. Their funding recommendations to the NCE Steering Committee reflected their judgement of the potential value added by additional investments in the different networks.

The Selection Committee ranked the networks in accordance with the five equally weighted selection criteria: excellence of the research program, highly qualified personnel, networking and partnerships, knowledge exchange and technologies exploitation, and management of the network. A threshold of excellence had to be exceeded for each criterion. Excellent research underpinning the network is a necessary, but not sufficient condition for success in this particular program.

The NCE Selection Committee Report may be obtained from the NCE Program Directorate by phone, (613) 995-6010, or fax, (613) 992-7356.

When asked to comment, Janet Walden, Chair of the NCE Management Committee, took the opportunity to thank the expert panels and the NCE Selection Committee on behalf of the program directorate: "We are extremely grateful for the time and effort that the expert peer reviewers and the NCE Selection Committee devoted to this difficult and important competition."

Research Update

Researchers to stimulate dialogue on animal welfare issues

Two internationally recognized researchers with a lifelong interest in animals have been appointed to lead a new NSERC-sponsored Animal Welfare Program at the University of British Columbia. Professor David Fraser and Associate Professor Dan Weary will investigate topics such as the way living conditions affect the well-being of animals, and ethical issues surrounding the use of animals in scientific research, sport, and food production.

The NSERC Industrial Research Chairs in Animal Welfare, to which Drs. Fraser and Weary have been appointed, were created with the support of a range of groups with strong ties to animal welfare issues. The B.C. Society for the Prevention of Cruelty to Animals and the B.C. Veterinary Medical Association joined forces with numerous animal agriculture groups to provide funding for the program. NSERC matched their donations, with a commitment of $813,500. "The broad-based support behind the positions is unique in the Canadian animal welfare research community," Dr. Fraser says.

The chairholders, who hold cross appointments with UBC's Dept. of Animal Science and Centre for Applied Ethics, will work closely with the UBC Animal Care Centre, with animal scientists in dairy, beef, poultry, aquaculture and other animal industries, and with biological and medical researchers.

Brock University inaugurates its Chairs in Oenology and Viticulture

The Honourable John Manley, Minister of Industry, was on hand to inaugurate two new chairs in Oenology and Viticulture at Brock University. Dr. Brzustowski and representatives of the Wine Council of Ontario, the Ontario Grape Growers' Marketing Board, and Inniskillin Wines, as well as senior officials at Brock University, were also present to mark the occasion.

Brock's first-ever Industrial Research Chairs will investigate the challenges facing Canada's grape-growers and wine-makers at the Cool Climate Oenology and Viticulture Institute (CCOVI) on Brock's campus. The research group will be directed by two Chairholders: oenologist Hennie van Vuuren, former Chair and Prof. of Microbiology at the University of Stellenbosch in South Africa, and viticulturist Andy Reynolds, former Research Scientist with the Pacific Agri-Food Research Centre in Summerland, British Columbia.

The President of Inniskillin Wines, Donald Ziraldo, observed: "Education and research will build on each other when they come together in the Institute. The 'Cool Climate' focus will be unique and

attract people worldwide."

Laval inaugurates LARSA/CRD grant on bovine sperm research

November 26 was a day of celebration at Laval University in Quebec City. Senator Pierre De Bané, representing Industry Minister John Manley, and Dr. Brzustowski spoke at events marking federal and provincial investments nearing $5 million.

Dr. Marc-André Sirard and his collaborators at four universities Laval, McGill, Montreal and Guelph will receive $2.04 million over the next three years through a Collaborative Research and Development grant from NSERC and the Cattle Breeding Research Council (CBRC). The CBRC, sponsored by SEMEX Alliance, is contributing over $1.08 million to assist in the development of new biotechnologies to increase the fertility and survival of bull spermatozoa.

The infrastructure and equipment of the 700 m^2 Laboratoire régional des sciences aquatiques (LARSA), located in the new Charles-Eugène Marchand building, represents an investment of approximately $2.7 million by the Quebec government, the Federal Office for Regional Development (Quebec) and NSERC. In 1994, Edwin Bourget of Laval's Department of Biology and ten collaborators from Laval and the Institut national de recherche (INRS) EAU were awarded $648,237 under NSERC's MFA/Infrastructure program.

The University of Montreal launches the RCM2 Research Network

The Réseau de calcul et de modélisation mathématique (RCM2), headed by Professor Luc Vinet of the University of Montreal, was launched on November 14. Dr. Brzustowski addressed the gathering, which included representatives from the industrial partners and five university institutions in Montreal. Mr. Nick Discepola, MP for Vaudreuil, spoke on behalf of Industry Minister John Manley.

This NSERC Research Network will receive approximately $3 million from NSERC and over $4 million from the private sector, other federal government departments and the Quebec government over the next five years. The research program will focus on the following three areas: risk management; information processing; and transportation and telecommunications.

The institutions participating in the network are: Centre interuniversitaire de recherche en analyse des organisations (CIRANO); Centre de recherche en calcul appliquée (CERCA); Centre de recherches mathématiques (CRM); Centre de recherches sur les transports (CRT); and Groupe d'études et de recherche en analyse des décisions (GERAD). Partners include Ad Opt, Atlantic Nuclear Services, the National Bank of Canada, Bell Mobility, the Caisse de dépôt et de placement du Québec, Canadian Pacific, the

Department of National Defence, Entreprises GIRO, Environment Canada, le Groupe Cartier, les Conseillers INRO, Hydro-Québec, Silicon Graphics, the Société de l'assurance automobile du Québec, Lockheed Martin of Canada, and Urgence Santé.

NSERC Improves Annual Reporting to Parliament

> *On April 24, 1997, the House of Commons passed a motion dividing what was known as* Part III of the Estimates *for each federal department and agency into two documents, a* Report on Plans and Priorities *and a* Departmental Performance Report.

NSERC has been involved in this government-wide initiative to improve the reporting to Members of Parliament and the public. The Council's first performance report was recently tabled in Parliament and is available electronically from the Treasury Board Secretariat Web site, http://www.tbs-sct.gc.ca/tb/key.html. Published each fall, the report covers the results and accomplishments of the preceding fiscal year (in the case of this year's report, the fiscal year ending March 31, 1997). In launching the reports for the Industry Canada Portfolio, of which NSERC is a member agency, the Hon. John Manley said that reporting on performance is an important element of program management in the Portfolio. "Identifying concrete objectives for programs and services, and measuring and reporting on progress over time, provides an accountability framework that enables Portfolio members to assess their effectiveness."

NSERC's first Report on Plans and Priorities will appear early next year. It will cover the projected expenditures following the next federal budget.